DOCUMENT RESUME

ED 285 134 CS 008 892

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TITLE The Cloze Procedure as Predictor of Undergraduate Achievement in Introductory Courses.
PUB DATE 86
NOTE 7p.; "Forum for Reading" is the journal of the College Reading Improvement Special Interest Group of the International Reading Association.
PUB TYPE Reports - Research/Technical (143) -- Journal Articles (080)
JOURNAL CIT Forum for Reading; v18 n1 p32-36 Fall-Win 1986

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Cloze Procedure; Content Area Reading; Critical Reading; Higher Education; Instructional Improvement; Introductory Courses; *Predictive Measurement; *Reading Comprehension; Reading Processes; Reading Research; Reading Tests; Undergraduate Students

ABSTRACT

In an attempt to improve general instruction at the college level, a study investigated the adaptability of the cloze procedure for use in undergraduate courses, specifically examining the relationship between cloze performance tests and student achievement. In the first portion of the study, six cloze procedure tests based on selections from five political science texts were administered to an introductory political science class in a midwestern state college. Results indicated a moderately strong association between the results on the cloze tests and the students' final grades. In order to verify the findings, the procedure was applied to students in introductory classes in three other disciplines: sociology, psychology, and biology. Results again indicated a positive correlation between cloze test results and final course grades. Findings suggest that the cloze procedure could serve as a useful predictor of class performance in many undergraduate introductory classes, with the potential for improving undergraduate instruction if used to select better textbooks and as an aid in making basic instructional decisions. (Tables of data and references are included.) (NKA)

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The Cloze Procedure as Predictor of Undergraduate Achievement in Introductory Courses

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The cloze procedure as predictor of undergraduate achievement in introductory courses

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There is a paucity of research on teaching and learning at the post-secondary level. Remarkably few empirical studies provide the college professor with usable methodology. What little does exist is generally not known or acted upon outside of remedial courses or education courses. The real crux of the problem lies not in providing more remedial programs or increasing graduation requirements but in improving general instruction and assisting students to learn how to learn within the context of their regular classes.

In our attempt to improve general instruction at the college level, we chose to investigate the cloze procedure for its adaptability to undergraduate classes. The procedure is relatively easy to use and can provide instructors with information about the degree of match between students' abilities and the demands of a required textbook. Although typically used to assist elementary and secondary teachers in textbook placement, we were interested in whether the cloze procedure might extract other valuable information for college instructors. Specifically, could it be used to predict the degree of success or achievement of students in college classes?

The initial research on cloze measures is credited to Wilson Taylor with subsequent extensive research by Rankin and Bormuth (Rye, 1982). These studies indicated that cloze scores are closely related to reading comprehension test scores; that is, those students who scored well on cloze tests also scored well on standardized reading achievement tests. This research, which demonstrated the validity and usefulness of the cloze procedure as a tool for reading placement, was conducted primarily at the elementary and secondary level. The need for such a simple, quick, inexpensive testing procedure at the college level is evident; yet there have been only a few studies validating its use at this level and certainly no widespread knowledge or use of the procedure by college professors.

A cloze test is constructed by selecting a representative passage of 250-350 words from the textbook in use or under consideration for adoption. The selection should reflect the typical reading demand of the text and should not have been read by the students prior to the test. Generally, every fifth word is deleted, after leaving the first and last sentences of the selection intact, until there is a total of 50 deletions. The test is administered with no time limits and after students have been given a short practice sample. As students read the selection, they are to predict the deleted words and supply them in writing. Misspellings are accepted.

Success on a cloze test seems to be the function of many factors: word recognition, syntactic skills or an understanding of how language goes together, semantic skills or an understanding of what the author is trying to say, background knowledge in the subject matter and the ability to apply that knowledge, vocabulary, ability to make inferences *while* reading, ability to see interrelationships among ideas, and skimming and scanning skills. Clearly, the cloze precedure takes into account the *interactive* relationship of these factors.

Sharon Pugh Smith, Director of the Indiana University Learning Skills Center, describes mature college readers as problem-solvers, which is, apparently, one reason why they are academically successful (Smith, 1982). It appears that the cloze task fits this description by requiring the reader to demonstrate the ability to use problem-solving skills in a highly content specific situation.

Other reading experts (Ashby-Davis, 1985) assert that the cloze procedure measures *more* than reading comprehension. As part of the cloze task is encoding, it may be that it is actually measuring a set of thinking processes related to reading and writing.

PROCEDURE AND FINDINGS

The setting for our study was a state college in the Midwest with a student body of over 5,000. It is an accredited institution which grants both bachelor's and master's degrees. Test scores of entering freshmen are consistent with national averages on the ACT.

In the first portion of our study we administered six tests developed with the cloze procedure to an introductory college class in political science. The six tests were based on selections from five political science textbooks recommended for the introductory level. To assess the nature of the association between the performance on the cloze tests and the students' achievement in the class, we calculated Pearson correlation coefficients for the relationships between the students' final grades in the class (measured on the standard four-point scale where A = 4.0, B = 3.0, etc.) and the students' scores on each of the six cloze tests. The results are presented in table 1.

Table 1

Correlation Coefficients Between Cloze Test Results and Final Class Grade, Introductory Political Science Class

	Cloze Test Number:					
	1	2	3	4	5	6
Grade	.590	.481	.477	.318	.529	.432
	n = 58	n = 61	n = 61	n = 59	n = 60	n = 57

In all cases the coefficients are positive, varying from .318 to .590, indicating a moderately strong association between the results on the cloze tests and the students' final grades.

In order to replicate and extend our findings, we applied the procedure to students in introductory classes in three other disciplines, sociology, psychology, and biology. Reading passages for the cloze tests were selected from sections of the assigned text in each of the classes chosen for study. At the end of the term the instructors provided us with their students' final letter grades which we transformed to their numerical equivalents. As had been the case in the political science class, the correlation between cloze test results and final class grade was positive (r = .492, n = 95).

A clearer idea of the nature of this relationship is provided by a graphical display. For figure 1 we have divided the students into four quartiles based on their cloze test results. The quartiles in our sample were defined by the following cloze test scores: first quartile = lowest to 16, second quartile = 17 to 21, third quartile = 22 to 24, fourth quartile = 25 to highest. The four points plotted in figure 1 represent the mean final class grade for each of the four

quartiles. The strongly linear nature of the relationship is perhaps the most striking element of the graph. One can see clearly that each step of improvement in cloze test performance is accompanied consistently by an improvement in average class grade. It seems reasonable to conclude that some ability which is being tapped by the cloze test is an important determinant of student achievement in these classes.

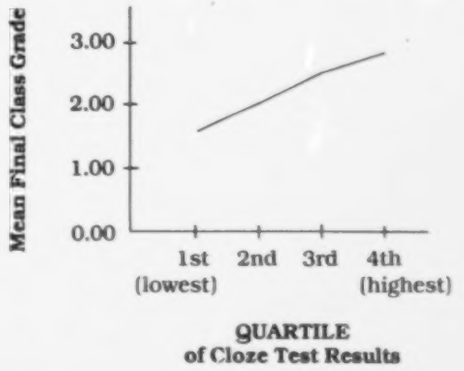

Figure 1. Mean Final Class Grade by Cloze Test Results (in Quartiles)

To examine the relationship more fully we decided to view the relationship while controlling for the class attended. We again examined the mean course grades for each quartile of performance on the cloze test; however, in this case we kept the three classes separate. The results are presented in table 2 and figure 2.

Table 2

Mean Final Class Grades by Level (Quartile) of Cloze Test Performance, by Class Attended (N in parenthesis)

	Quartile				
	1st (lowest)	2nd	3rd	4th (highest)	TOTAL
Sociology	1.571 (14)	2.286 (7)	2.571 (7)	2.800 (5)	2.121 (33)
Psychology	2.000 (1)	2.333 (9)	3.100 (10)	3.429 (7)	2.889 (27)
Biology	1.429 (7)	1.286 (7)	2.250 (8)	2.462 (13)	1.971 (35)
TOTAL	1.545 (22)	2.000 (23)	2.680 (25)	2.800 (25)	2.284 (95)

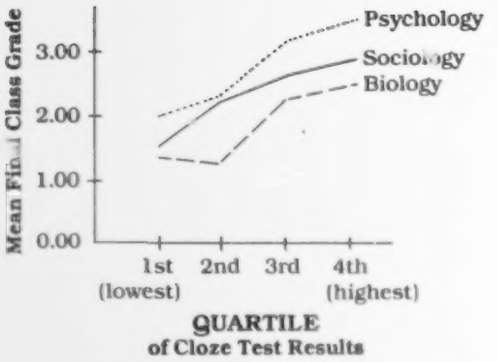

Figure 2. Mean Final Class Grade by Cloze Test Results, by Class Attended

With one minor exception, in the step from the first to the second quartile in the biology class, the positive, linear association between cloze test results and final class grade holds for all three classes. For example, the average grade for sociology students who performed most poorly on the cloze test was 1.571, midway between a D and a C. Those in the next two quartiles did progressively better in the class while the best performers on the cloze test had the highest average course grade, 2.8, or approximately a B. In psychology the grades are somewhat higher but the pattern is similar; the two quartiles performing most poorly on the cloze tests achieved an average of C in the class while the highest-scoring quartile approached an A average for the class. Although similar, the relationships exhibited in the three classes are not identical in strength. As seen in figure 2, the sociology and psychology classes exhibit steeper, more consistent slopes than the biology class, indicating that cloze test results were better predictors of course performance in these classes than they were in biology. Correlation coefficients for the three classes reflect this difference. Sociology had the highest r, a .576, while the psychology class produced a .493 and biology a .453. Nevertheless, all coefficients are moderately strong and indicate that between 20 and 33 percent of the variation in course grade is accounted for by the cloze test results (r^2 = proportion of explained variance).

DISCUSSION

Although these differences in relationships between cloze test scores and grades among the three classes are rather small and may be merely random variation, it is interesting to speculate on their possible theoretical significance. One contributing factor may be the variations in objectives and grading criteria for the three classes examined. While there are no mandatory grading policies for the college, most instructors base final grades on a straight percentage formula rather than a curve.

Another factor may be the varying requirements for writing in the three classes. Writing exercises with special emphasis on developing writing skills were a less important part of the biology instruction than in the two social

science classes. It is quite possible that complex thinking processes related to reading and writing are tapped by the cloze procedure. If these processes are also an important determinant of the class grade then the association between cloze test score and class grade ought to be stronger than in classes which give such skills little weight.

A more solid explanation for these slight differences among the classes cannot be provided with the data presented here but may be addressed in future research. The examination of the relationship between cloze test results and class performance extended to other collegiate levels and subjects should illuminate this and other questions. Nevertheless, it seems clear that the cloze procedure may serve as a useful predictor of class performance in many undergraduate introductory classes. Such use, we believe, has potential for improving undergraduate instruction in the following ways.

First, textbook selection can be improved. Generally, textbooks are selected on the basis of instructor personal preference. This usually includes familiarity with the content and/or author and a sense that there is a satisfactory match between the course description and the textbook content. Almost never are students' learning needs and reading abilities taken into account in any systematic manner when selecting texts. Moreover, traditional readability formulas provide misleading or at best meaningless information at the college level.

Administering a cloze test on textbooks under consideration for adoption can give the instructor or department additional objective data on which to base the selection decision. The cloze test requires a minimal amount of time to administer. Yet it provides powerful information on the degree of match between the students' levels of functioning and the textbook demands.

Second, instructors could use the information on total class performance to assist them in making basic instructional decisions such as time on task, pacing, and the selection of appropriate and effective teaching strategies. While more research is needed, our preliminary findings seem to suggest that a class mean of 20.0 (40%) may serve as a workable criterion level for determining when there is considerable mismatch between the students and the text. A class mean below 20.0 could signal to the instructor the need to devote considerable attention to helping students learn the specialized vocabulary of the discipline, how to master abstract concepts, and how to understand complex relationships. Additionally, the Academic Support Services of a college could provide a highly useful function by preparing and scoring cloze tests and consulting with faculty on the results.

Higher education is increasingly criticized for its lack of emphasis on teaching, its failure to serve students adequately, and its lowered standards. We believe that our work with the cloze procedure may begin to provide professors with tools and methodology to meet the challenge of simultaneously assisting students to think at higher levels of sophistication and complexity while teaching the introductory content of a discipline.

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